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MAMMALS FROM SOUTHWESTERN NORTH DAKOTA

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The distribution of the mammals in the southwestern part of North Dakota and their ecological and taxonomic relationships have not been well documented. In addition to Vernon Bailey's (1927) survey of mammals of the state, based primarily upon field work conducted between 1912 and 1916, the only other principal studies dealing with the mammalian fauna of southwestern North Dakota were a preliminary report of the mammals of the state by Bailey *et al.* (1914) and the publication by J. A. Allen (1875) on mammals taken by the expedition that surveyed a route for the North Pacific Railway. Our studies, which were confined to that part of North Dakota bordered on the east and north by the Missouri River (Fig. 1), began in 1961 when members of a summer field course in vertebrate zoology from The University of Kansas collected briefly in Slope County. In the summers of 1965 and 1970, other field classes worked in Billings, Bowman, and Dunn counties. Also in the summer of 1970, studies were conducted on small mammals on the Grasslands Biome Comprehensive Site (International Biological Program) near Dickinson, Stark County, and in adjacent areas.

Thirty-nine species of mammals were collected or observed in the course of field work in southwestern North Dakota. In the following accounts, we have attempted to summarize ecological and distributional data for each species, and have appended taxonomic comments where appropriate. It is hoped that this study, together with those by Andersen and Jones (1971) on northwestern South Dakota and one underway by Richard P. Lampe and associates (see Lampe, 1971) on southeastern Montana, will provide a better understanding of the mammalian fauna of this important region of the Northern Great Plains.

COLLECTING SITES

A short description of each major collecting site visited in southwestern North Dakota is given below. Botanical nomenclature follows Stevens (1963).

Killdeer Mountains, Dunn County.—The Killdeer Mountains are part of a system of Tertiary erosional remnants that form spectacular buttes and hills in southwestern North Dakota and adjacent parts of Montana and South Dakota (Andersen and Jones, 1971:363; Lillegraven, 1970:832). The Killdeers rise approximately 700 feet above the surrounding plain to a highest elevation of 3314 feet. Although of the same geological formation as the buttes to the south and west, the Killdeer Mountains differ in being clad almost completely by deciduous trees rather than conifers; the only species of the latter group that we noted was creeping cedar (*Juniperus horizontalis*), which grew in exposed situations at higher elevations. Deciduous trees obtain elsewhere on the hills and along streams that drain onto the surrounding lowlands. The following deciduous species were observed in various situations: green ash (*Fraxinus pennsylvanicus*), bur oak (*Quercus macrocarpa*), round-leaved hawthorn (*Crataegus rotundifolia*), American elm (*Ulmus americanus*), aspen (*Populus tremuloides*), cottonwood (*Populus deltoides*), river birch (*Betula fontinalis*), box-elder (*Acer negundo*), and willow (*Salix* sp.). Hazelwood (*Corylus americana*) and bird cherry (*Prunus pennsylvanica*) formed a dense layer under the trees in many places. Several streams with relatively moist banks ran along the edges of the Killdeers and away from them; numerous artificial impoundments used for watering cattle were located in the hills and in surrounding areas. The vegetation of the plains closely resembled that of the area around Dickinson.

Vicinity of Dunn Center, Dunn County.—Several habitats were trapped in the vicinity of the Lake Ilo National Wildlife Refuge. The muddy lake lacked a riparian community except in the vicinity of the spillway where several short, woody shrubs, cattails (*Typha latifolia*), big bluestem (*Andropogon gerardi*), and sloughgrass (*Beckmannia syzigachne*) were found. The remainder of the refuge and fencerows elsewhere that had not been grazed or mowed supported tall stands (12 to 60 inches) of grasses and forbes including big bluestem, blue grama (*Bouteloua gracilis*), bromegrass (*Bromus inermis*), goatsbeard (*Tragopogon dubius*), sunflowers (*Helianthus annuus*), sweetclover (*Melilotus officinalis*), and alfalfa.

Northeast of Sentinel Butte, Golden Valley County.—In this area, trapping was conducted in several dry ravines and on the adjacent prairie. The relatively dense growth of woody vegetation found in the ravines included green ash (*Fraxinus pennsylvanicus*), cottonwood (*Populus deltoides*), willow (*Salix* sp.), wild rose (*Rosa multiflora*), buffaloberry (*Shepherdia argentea*), and poison ivy (*Rhus radicans*). Above the ravines this woody vegetation gave way abruptly to sage and prairie grasses.

Little Missouri River southwest of Medora, Billings County.—The valley of the Little Missouri River at this point was approximately one mile wide. Within 100 yards of the river, the sandy floodplain supported a riparian community dominated by cottonwoods (*Populus deltoides*) and numerous thickets of rose (*Rosa multiflora*). Other common plants on the floodplain included waving butterfly (*Gaura coccinea*), knotweed (*Polygonum* sp.), collomia (*Collomia linearis*), bluegrass (*Poa* sp.), bromegrass (*Bromus* sp.), and needle-and-thread

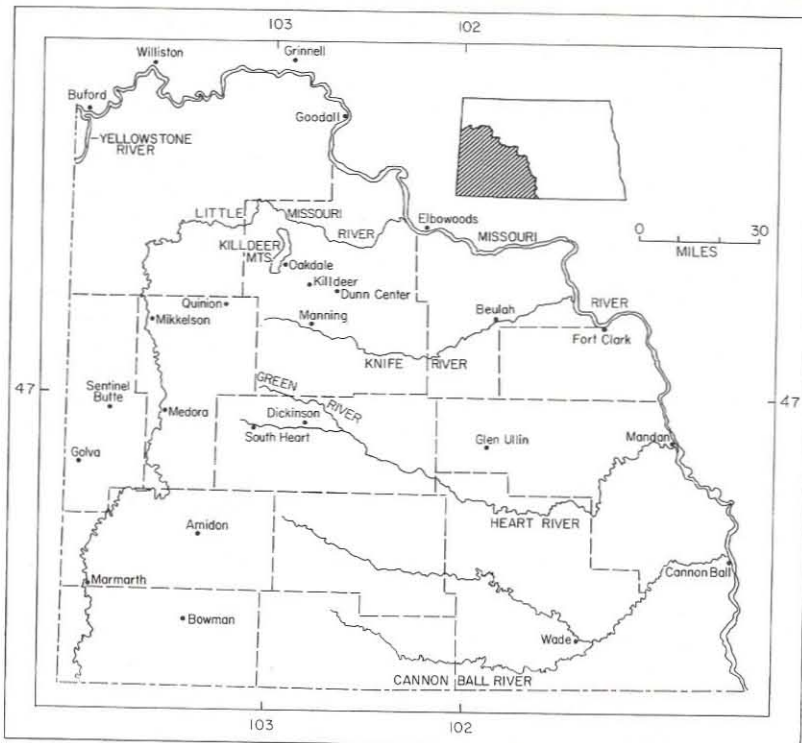


FIG. 1.—Map of southwestern North Dakota on which localities mentioned in text are plotted.

grass (*Stipa comata*). Beyond the riparian community on the floodplain, the vegetation consisted of numerous clumps of sage (*Artemisia frigida*) interspersed with grasses. The bluffs and rugged cliffs along the edges of the valley form part of the Little Missouri Bad Lands; generally these areas were denuded of vegetation. On the uplands above the bluffs (where the land was not in agricultural use), the vegetation consisted of short grass prairie characterized by the presence of blue grama (*Bouteloua gracilis*), buffalo grass (*Buchloe dactyloides*), and needle-and-thread grass (*Stipa comata*).

Vicinity of South Heart, Stark County.—Trapping at this place was conducted along the Heart River and in nearby roadside ditches. The river is narrow at this point being only about six feet wide and is situated in a 10-foot-deep ravine. A riparian community is essentially nonexistent with only a narrow thicket of buffaloberry (*Shepherdia argentea*) and a few widely scattered cottonwoods lining the edge of the ravine. Most of the low-lying surrounding area was under agricultural usage and the uplands were in pastures of native grass. The roadside ditch in which we trapped had been planted to brome grass and alfalfa.

Vicinity of Dickinson, Stark County.—Much of the trapping in the vicinity of Dickinson was conducted on the Dickinson Site of the Grassland Biome Comprehensive Network (International Biological Program), which is located

one mile north and one mile west of Dickinson. The site was situated on two low hills just to the north of Interstate 94. The grassland vegetation of the site, which is fairly typical of northern plains mixed grass prairie, has been designated as the needle-and-thread, blue grama, sedge type (see Whitman, IBP Grassland Biome Technical Report no. 40). Principal grasses and sedges that composed 80 per cent of the total cover were needle-and-thread (*Stipa comata*), blue grama (*Boutelous gracilis*), western wheatgrass (*Agropyron smithii*), threadleaf sedge (*Carex filifolia*), and needleleaf sedge (*Carex eleocharis*). Important secondary grasses (making up about 15 per cent of the total cover) were prairie junegrass (*Koeleria cristata*), green needlegrass (*Stipa viridula*), plains reedgrass (*Calamagrostis montanensis*), prairie sandreed (*Calamovilfa longifolia*), and Sandberg bluegrass (*Poa secunda*). Numerous species of broad-leaf plants accounted for about 5 per cent of the total cover. Much of the area in the vicinity of Dickinson and around the grassland site was planted to small grains or corn. Other trapping in this area was conducted mainly in brome grass (*Bromus inermis*) planted in roadside ditches and the right-of-way along an interstate highway.

Weather data recorded at the Dickinson Experiment Station for the period 1892 to 1960 can be considered as representative for southwestern North Dakota, which is semiarid and with cold winters and hot summers. At Dickinson, the coldest month of the year is January with an average temperature of 11.0 F, whereas that for July, the hottest month, is 69.0 F. More than 75 per cent of the annual precipitation of 15.50 inches falls in the period April to September; June (average 3.50 inches of precipitation) is the wettest month, and December (average 0.40 inch) is the driest month. Snowfall amounts to an average of 31.8 inches annually and is recorded from every month from September through June (Climatography of the United States, no. 20-32, Dickinson, North Dakota).

Two grids were extensively trapped on the IBP site northwest of Dickinson. One grid, on which snap traps were used, was located in a moderately grazed pasture. It consisted of 12 by 12 stations, with a 15-meter interval between each station, giving the grid an area of 2.76 hectares and an effective trapping area of 3.24 hectares; two traps were set at each station for 10 nights during two trapping periods (16 through 25 June 1970 and 2 through 11 August 1970). A smaller grid on which live traps were used was located within an enclosure that had not been grazed since 1961. This grid, which was nearly triangular in shape, covered an area of about 1.1 hectares. Two traps were set at each of 56 stations for 10 days during two trapping periods (13 through 23 June 1970 and 2 through 11 August 1970). For computation of population densities, the effective trapping area was used for the snap-trap grid and the actual area trapped was used for the live-trap grid (the latter figure was used because the vegetation outside the enclosure was sparse on two sides and it was elsewhere bordered by plowed fields).

East of Dickinson, Stark County.—Here, along the Green River, a relatively well-developed riparian community was found. In the immediate vicinity of the river was a woodland consisting of cottonwood (*Populus deltoides*), willow (*Salix amygdaloides*), and green ash (*Fraxinus pennsylvanica*). Beyond this woodland and also forming an understory in it were buckbrush (*Symphoricarpos occidentalis*), wild rose (*Rosa multiflora*), chokecherry (*Prunus virginiana*), and poison ivy (*Rhus radicans*). The riparian community is mainly confined to the banks and slopes of the river. On the plains above the river, sage and grasses prevail; tall brome grass grew in roadside ditches.

Little Missouri River northwest of Amidon, Slope County.—The valley of the Little Missouri River was relatively wide at this point and was generally vegetated with short grasses and sage except along the edge of the river where some lush grasses were noted. However, many areas had been overgrazed. Several good stands of cottonwoods (*Populus deltoides*) grew in the valley; pines (*Pinus ponderosa*) and cedar (*Juniperus scopularum*) adorned the slopes and hills of the valley sides, especially to the east.

South of Bowman, Bowman County.—Vegetation in this area consisted of tall, lush grasses and reeds adjacent to standing water in a marshy, low-lying area near a small creek. Tall stands of brome grass grew along a highway right-of-way. Active and fallow wheat fields were located on higher ground above the marsh.

Little Missouri River in southwestern Bowman County.—At this place along the Little Missouri River there is little typical riparian vegetation, with the exception of a narrow stand of tall grasses and a few willows between the river and the steep, 20-foot-high bank to the south. On the north side of the river and on the uplands to the south of the river were extensive stands of sage, short grasses such as blue grama (*Bouteloua gracilis*), buffalo grass (*Buchloe dactyloides*), and needle-and-thread (*Stipa comata*), as well as prickly pear (*Opuntia polycantha*). The general area, especially south of the river, appeared to be heavily grazed. Some fields planted to wheat are found in the sandy upland away from the river.

ACCOUNTS OF SPECIES

Thirty-nine species of mammals collected or observed in southwestern North Dakota are treated in the accounts that follow. Specimens that have been examined are listed in telegraphic style preceding remarks; counties have been arranged alphabetically and localities within each county are arranged from north to south in these lists. Unless noted otherwise, all specimens listed are deposited in the Museum of Natural History at The University of Kansas. All standard external and cranial measurements are given in millimeters and weights are recorded in grams.

Sorex cinereus haydeni Baird, 1858

Specimens examined (7).—BOWMAN COUNTY: 2 mi. S Bowman, 1. DUNN COUNTY: 8 mi. N, 7 mi. W Killdeer, 2800 ft., 1; 6 mi. N, 6½ mi. W Killdeer, 2700 ft., 1; ½ mi. N, 2 mi. W Dunn Center, 1; ¾ mi. S, 1½ mi. W Dunn Center, 1; ¾ mi. S, 1 mi. W Dunn Center, 1. STARK COUNTY: 1 mi. N, 1 mi. W Dickinson, 2700 ft., 1.

All specimens with the exception of one from near Dickinson were taken in mesic habitats. Those from the Killdeer Mountains were trapped along moist stream banks that were covered with tall reeds and grass and three from the vicinity of Dunn Center were collected in marshy lowlands adjacent to Lake Ilo. The specimen from south of Bowman was obtained in a low-lying, marshy area near a small creek.

The one shrew from northwest of Dickinson was taken in a relatively dry roadside ditch, which was planted to brome grass.

Only one of the seven specimens was a female, which was found to be lactating when obtained 8 mi. N and 7 mi. W Killdeer on 25 July 1970. Dates of capture and length of testes of the six males follow: 30 June (3), 23 July (1), 1 August (3, 3, 4), and 4 August (2). No molt was in evidence on any of our specimens, all of which were in summer pelage.

***Myotis evotis evotis* (H. Allen, 1864)**

Specimens examined (2).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 1. DUNN COUNTY: 5 mi. N, 6½ mi. W Killdeer, 3000 ft., 1.

A specimen of this species from Billings County was shot on the evening of 26 June 1965 as it foraged among trees along the Little Missouri River. Another from Dunn County was obtained in a sink-hole, known locally as Medicine Hole Cave, near the top of the Killdeer Mountains. Both specimens are adult males with testes 5 in length and in fresh pelage.

D. G. Schall and W. Russ descended approximately 25 feet to the bottom of Medicine Hole Cave, which extended as a narrow crack to both the east and west, with the top of the crack located about 15 feet above the floor. They were able to move only a few feet in either direction before the passage became too narrow to follow. Although the squeaking of several bats could be heard, they were able to obtain but a single specimen of *Myotis evotis*. Netting the entrance to the sink that evening (24 July 1970) yielded three *Myotis lucifugus*. The locality in Dunn County is slightly to the east of the two other places in North Dakota from which *evotis* is known—the Medora site listed above and 4 mi. W Grinnell, Williams County (Bailey, 1927:217).

***Myotis leibii ciliolabrum* (Merriam, 1886)**

Specimens examined (7).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 6. SLOPE COUNTY: 8 mi. N, 7½ mi. W Amidon, 1.

This saxicolous species appeared to be the commonest member of the genus along the bluffs and badlands lining the Little Missouri River southwest of Medora. Of the six adult females collected there between 16 and 24 June 1965, two were pregnant; each contained a single embryo that measured 9 (17 June) and 11 (24 June) in crown-rump length. The pregnant female obtained on 24 June was in the early stages of molt. An adult female from Slope County, which was reported previously by Jones and Stanley (1962:263), also contained a single embryo that measured 15 in crown-rump length on 29 June

1961. This specimen was captured just after midnight as it hung on the underside of a large rock that projected horizontally from a rocky slope bordering the valley of the Little Missouri River.

The bats listed in this account are the only specimens of *M. leibii* known from North Dakota, Bailey's (1927:216) account of this species actually applying to *Myotis keenii* (see Miller and Allen, 1928:168). We follow Glass and Baker (1968:259) in the use of the specific name *leibii* for this species, formerly known as *Myotis subulatus*.

***Myotis lucifugus carissima* Thomas, 1904**

Specimens examined (15).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 3. DUNN COUNTY: 7½ mi. N, 7½ mi. W Killdeer, 2800 ft., 7; 7 mi. N, 9 mi. W Killdeer, 2800 ft., 2; 5 mi. N, 6½ mi. W Killdeer, 3000 ft., 3.

Three males from 1 mi. S and 1 mi. W Medora were shot on the evenings of 17 and 18 June 1965 as they flew among trees along the Little Missouri River. Two other males were shot on the evenings of 21 and 22 July 1970 at a place 7 mi. N and 9 mi. W Killdeer as they flew over a small impoundment in a grassy meadow surrounded on three sides by deciduous forest, and seven specimens (four males and three females) from 7½ mi. N and 7½ mi. W Killdeer were taken along with specimens of *Eptesicus fuscus* from the sill above a door in a garage. Three male *M. lucifugus* from 5 mi. N and 6½ mi. W Killdeer were taken in a mist net as they emerged from Medicine Hole Cave; other bats, some of which may have been this species, were seen leaving the cave but escaped our net owing to high winds.

As pointed out earlier by Jones and Genoways (1966:89), bats of this species from western North Dakota are intergrades between *M. l. carissima* and *M. l. lucifugus*. In color, our specimens are intermediate between the two subspecies and, in fact, those from the Killdeer Mountains, which are in fresh pelage, are relatively dark as compared with other specimens. In cranial characters, however, all our specimens most closely agree with *carissima*, to which we have assigned them.

None of the three adult females obtained on 24 July 1970 evinced gross reproductive activity. Nine adult males collected in the Killdeer Mountains between 21 and 25 July 1970 had testes that averaged 7.1 (6-8) in length, whereas two males obtained southwest of Medora on 18 June 1965 had testes that measured 4 in length.

***Myotis volans interior* Miller, 1914**

Specimen examined (1).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 1.

The only specimen of this species known from southwestern North Dakota was shot on 28 June 1965 as it foraged among trees along the Little Missouri River. An adult male, it weighed 6.8 and had testes that measured 4 in length. This specimen and nine reported from Granville, McHenry County, by Genoways (1967:355) are the north-easternmost known records for the species.

***Eptesicus fuscus pallidus* Young, 1908**

Specimens examined (36).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 15. DUNN COUNTY: 7½ mi. N, 7½ mi. W Killdeer, 2800 ft., 20; 7 mi. N, 9 mi. W Killdeer, 2800 ft., 1.

The big brown bat evidently is the commonest member of the order in southwestern North Dakota. Fifteen specimens were shot as they flew among and over trees along the Little Missouri River south of Medora. Another was shot as it flew over a small impoundment located just to the west of the Killdeer Mountains in a meadow surrounded on three sides by deciduous trees. The remaining 20 specimens from the Killdeer Mountains were collected along with seven specimens of *M. lucifugus* from the sill above a door in a garage on 24 July 1970.

Of the 15 specimens taken southwest of Medora, eight were females of which four were pregnant. One, taken on 17 June 1965, carried two embryos that were 12 in crown-rump length, whereas the remaining three each carried a single embryo that measured 13 (17 June), and 11 and 21 (both 24 June). Six adult males from this place had testes that averaged 6.6 (4-9) in length. The colony from the garage near the Killdeer Mountains was a maternity colony as 10 of 20 bats collected there were young of the year. Some of these young, all of which were taken on 24 July 1970, were capable of flight but others were not; the largest had a forearm that measured 45.7, similar in size to that of adults, and the smallest had a forearm measuring 36.9. Six of the nine adult females had completed lactation and also annual molt. The three lactating females, the one adult male present in the maternity colony, and the adult male shot to the west of the Killdeer Mountains (21 July 1970) were all in early stages of molt and appeared to be following the sequence described by Jones and Genoways (1967:193) for this species in South Dakota. A nonpregnant female taken on 17 June 1965 south of Medora was also in the early stages of annual molt. The adult males from the Killdeer Mountains had testes that measured 10 (21 July) and 3 (24 July).

As first pointed out by Jones and Genoways (1966:90) and later by Long and Severson (1969:623), specimens of *Eptesicus fuscus* from

western North Dakota are best assigned to the subspecies *pallidus* rather than *E. f. fuscus*, under which name they were recorded by Bailey (1927:210).

***Lepus americanus americanus* Erxleben, 1777**

Specimen examined (1).—DUNN COUNTY: 7 mi. N, 9 mi. W Killdeer, 2800 ft., 1.

Although the snowshoe hare is a relatively common inhabitant of northern North Dakota, and has been reported from along the Missouri River at Buford, Elbowood, and Cannon Ball (Bailey, 1927:139), the species evidently has not been reported previously from southwest of the river. Our one specimen, a juvenile female, was taken in a museum special trap on the night of 21 July 1970 in a stand of tall birch and aspen trees in the Killdeers. There was little underbrush or other cover beneath the trees, probably because of shading by the large trees. Although in a low lying valley, the area under the trees was not particularly wet at the time of our visit.

***Lepus townsendii campanius* Hollister, 1915**

Specimens examined (6).—BOWMAN COUNTY: 8 mi. S, 26 mi. W Bowman, 2900 ft., 2; 13 mi. S, 26 mi. W Bowman, 3000 ft., 2. MERCER COUNTY: 18½ mi. S Beulah, 1. STARK COUNTY: 2 mi. N, 1 mi. W Dickinson, 1.

Populations of white-tailed jackrabbits were low in the summer of 1965 in the vicinity of Medora and in the summer of 1970 in the vicinity of Dickinson. No specimens were taken in more than a week of field work near Medora and only three individuals were seen in the vicinity of Dickinson in more than two weeks of work. However, these jackrabbits were abundant in southwestern Bowman County in the summer of 1970; four specimens were taken in three days there and numerous others were observed in the wild and dead along roads. The species also was abundant at this time in adjacent parts of South Dakota and Montana.

Four specimens from southwestern Bowman County, taken in an area of sagebrush and short grasses in mid-July, included two sub-adult males, a nonpregnant adult female, and an adult male (testes 5.5). An adult female from Stark County, taken on 18 June 1970 in an area under cultivation in which small grains were the most important crop, carried seven embryos that measured 27 in crown-rump length, five in the left horn of the uterus and two in the right. The specimen from Mercer County, an adult male, was found dead along a road. James and Seabloom (1969) extensively studied reproduction of the white-tailed jackrabbit in southwestern North Dakota.

***Sylvilagus audubonii baileyi* (Merriam, 1897)**

Specimens examined (3).—BILLINGS COUNTY: 1 mi. S Medora, 2300 ft., 1. BOWMAN COUNTY: 11 mi. S, 26 mi. W Bowman, 2900 ft., 1; 16 mi. S, 27 mi. W Bowman, 2900 ft., 1.

We found this upland species nowhere common in southwestern North Dakota. A female from 1 mi. S Medora, shot on 29 June 1965 in an area of tall grass and sagebrush along the eastern edge of the valley of the Little Missouri River, had four placental scars. A non-pregnant female was taken on 19 July 1970 in a similar habitat along Box Elder Creek at a place 16 mi. S and 27 mi. W Bowman, and a juvenile male was caught by hand on 19 July 1970 at a place a few miles to the north in an area of short upland grasses and clumps of sage located in the hills above the Little Missouri River. The desert cottontail is confined in North Dakota to the extreme southwestern part (see Bailey, 1927:134).

Two species of ticks (*Dermacentor andersoni* and *Haemaphysalis leporispaliestris*) were found on specimens of *Sylvilagus audubonii* obtained southwest of Bowman.

***Sylvilagus floridanus similis* Nelson, 1907**

Specimens examined (7).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 2. DUNN COUNTY: 7 mi. N, 9 mi. W Killdeer, 2800 ft., 2; 6 mi. N, 6½ mi. W Killdeer, 2700 ft., 1; 5 mi. N, 6½ mi. W Killdeer, 3000 ft., 1. SLOPE COUNTY: 8 mi. N, 7½ mi. W Amidon, 1.

Our specimens of *S. floridanus* from southwestern North Dakota came from two basic habitats. Four were collected in deciduous forests of the Killdeer Mountains and the other three are from the riparian community along the Little Missouri River. Two specimens from the Killdeers were shot at 4 PM as they fed in an alfalfa field adjacent to a dense stand of deciduous trees and shrubs. On 25 July 1970, another individual was shot in a stand of deciduous trees composed mainly of bur oak along the southeastern side of the mountains; in a similar situation, a juvenile eastern cottontail was caught in a museum special snap trap at a place 6 mi. N and 6½ mi. W Killdeer on 23 July 1970. Along the Little Missouri River, one juvenile was trapped on 17 June 1965 and two adults were shot on 29 June 1961 and on 16 June 1965 in stands of cottonwood trees with an undergrowth of wild rose.

Both adult females obtained were pregnant—one, from south of Medora, contained four embryos that measured 40 in crown-rump length on 16 June 1965 and the other, from the Killdeer Mountains, carried five embryos that measured 70 on 25 July 1970. An adult male obtained on 21 July 1970 had testes that were 30 in length. Three of

the four adults prepared as museum study skins were molting when taken on 29 June 1961, 21 July 1970, and 25 July 1970.

Bailey (1927:134) reported *S. floridanus* from west of the Missouri River in North Dakota only from the immediate vicinity of the river and from Oakdale. Elsewhere in the western part of the state, he recorded the presence of *Sylvilagus nuttalli grangeri* (from Ft. Buford, Goodall, Mikkelson, and Medora). We have re-examined the skulls of specimens assigned to *S. nuttalli* by Bailey and concur that they represent that species. Seemingly, then, inasmuch as *floridanus* and *nuttalli* are thought to be allopatric, the former has replaced the latter over much, if not all, of the southwestern part of the state in recent years (specimens of *nuttalli* collected in 1887, 1913, and 1918). Cranially, Dakotan specimens of *floridanus* differ from those of *nuttalli* in being larger, having broader nasals and, therefore, a broader rostrum, postorbital processes that fuse posteriorly with the braincase, a larger and more triangular interparietal, and decidedly smaller auditory bullae and external auditory meatuses.

***Eutamias minimus pallidus* (J. A. Allen, 1874)**

Specimens examined (27).—BILLINGS COUNTY: 2 7/10 mi. W Medora, 2300 ft., 1; 1 mi. S, 1 mi. W Medora, 2300 ft., 8; 1 1/2 mi. S Medora, 2400 ft., 1. DUNN COUNTY: 8 mi. N, 7 mi. W Killdeer, 2800 ft., 1; 7 mi. N, 9 mi. W Killdeer, 2800 ft., 2; 5 mi. N, 6 1/2 mi. W Killdeer, 3000 ft., 1. GOLDEN VALLEY COUNTY: 2 1/2 mi. N, 8 1/2 mi. E Sentinel Butte, 3. STARK COUNTY: 9 mi. E Dickinson, 10.

This chipmunk occurs in southwestern North Dakota mainly in badland areas and other rocky situations. Specimens were obtained in such areas as in the bluffs along the Little Missouri River south of Medora, in the riparian habitat along the bluffs near the Green River east of Dickinson, among trees and brush in a dry ravine northeast of Sentinel Butte, and in rocky outcrops in the Killdeer Mountains. Three specimens from the Killdeers were taken in areas of deciduous trees where there were numerous logs on the ground. South of Medora, three juveniles were obtained on 28 June 1965 at the opening of a hole located about 12 feet above the ground in a cottonwood tree. Evidently a litter, which consisted of at least six individuals, had been raised in the hollow. The tree was located on a brushy creek bank adjacent to a pasture and a short distance from the bluffs along the valley of the Little Missouri.

None of our adult females, obtained between 17 June and 10 August, was pregnant, but five were lactating on the following dates: 17 June, 18 June, 28 June, 29 July, and 31 July. The lactating female taken on 29 July had three placental scars in the right uterine horn and one in the left. Females of the least chipmunk are thought to bear but

one litter annually. Based on our limited data, it appears that most litters are born in late May and early June in southwestern North Dakota but that some females bear young as late as the end of June or early July. An adult male taken on 18 June had testes that were 9 in length, whereas those of one captured on 23 July measured 6.

Individuals molting from one adult pelage to another were taken on 18 June, 23 July, 29 July, and 31 July. Those taken in June were beginning molt in the middorsal region just posterior to the ears, whereas those from July had nearly completed the process, molt being evident only on the rump or venter. New adult pelage is noticeably more ochraceous in comparison with the older grayish-white pelage.

Specimens of a louse, *Hoplopleura sciuricola*, and a flea, *Monopsyllus eumolpi eumolpi*, were obtained from *Eutamias minimus* in southwestern North Dakota.

***Spermophilus tridecemlineatus pallidus* J. A. Allen, 1874**

Specimens examined (15).—BOWMAN COUNTY: 11 mi. S, 26 mi. W Bowman, 2900 ft., 1. DUNN COUNTY: ¾ mi. S, 1½ mi. W Dunn Center, 1. MERCER COUNTY: 7 mi. S Beulah, 1. STARK COUNTY: 1 mi. N, 1 mi. W Dickinson, 2700 ft., 10; 1 mi. W Dickinson, 1; ½ mi. W Dickinson, 2500 ft., 1.

Thirteen-lined ground squirrels are common in southwestern North Dakota in short grass situations and along roadsides that are mowed regularly. The species was especially abundant northwest of Dickinson where sandy soils and a ready food supply provided near optimum conditions. Ground squirrels in this area were feeding on seeds and young plants of corn and wheat. During the first trapping period (13 to 25 June 1970), at the Dickinson IBP site, six individuals were marked on a live-trap grid (area 1.1 hectares) and three were taken on the snap-trap grid (area 3.24 hectares); in the second trapping period seven and six were taken on these grids, respectively. However, because of the relatively high vagility and diurnal activity pattern of thirteen-lined ground squirrels, it is doubtful that the species was adequately sampled by the methods used in the IBP study.

A female taken on 20 June 1970 was lactating and evinced nine placental scars. Testicular length of adult males follows (date of capture in parentheses): 7 (16 June); 8 and 12 (19 June); 10 (24 June); 7 (6 August). An adult male obtained on 6 August 1970 was molting over much of the dorsum.

We found specimens of *Spermophilus tridecemlineatus* to be parasitized by a mite (*Androlaelaps fahrenheitsi*) and two species of fleas, *Opisocrostis bruneri* and *Thrassis bacchi bacchi*.

***Cynomys ludovicianus ludovicianus* (Ord, 1815)**

Specimens examined (3).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 3.

Although this species once was abundant southwest of the Missouri River in North Dakota (Bailey, 1927:63), its numbers have been greatly reduced by the use of poisons in rodent control programs. We saw only one small prairie dog town, located in a depression between rolling hills just above the valley of the Little Missouri River, in all of our work in the area. The town covered no more than 15 acres and contained 50 to 75 individuals including young of the year. Two of the three specimens obtained on 29 June 1965 were lactating adult females and the third was a juvenile male, with the third molar unerupted, that weighed 383.3 grams.

***Sciurus carolinensis pennsylvanicus* Ord, 1815**

Specimen examined (1).—DUNN COUNTY: 5 mi. N, 6½ mi. W Killdeer, 3000 ft., 1.

A gray squirrel was shot by E. J. Spicka in a stand of bur oak along the southeastern edge of the Killdeer Mountains on the morning of 24 July 1970. According to Hibbard (1956:529), 12 gray squirrels were introduced into the Killdeer Mountains in 1951 and 1952 from stock obtained in Burlington, Wisconsin. Hibbard (*op. cit.*, 527) also noted that 18 fox squirrels (*Sciurus niger*) from along the Missouri River at Bismarck were introduced into the Killdeers in 1953 and 1954.

***Thomomys talpoides rufescens* Wied-Neuwied, 1839**

Specimens examined (60).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 27. BOWMAN COUNTY: 2 mi. S Bowman, 1; 11 mi. S, 26 mi. W Bowman, 2900 ft., 4; 13 mi. S, 26 mi. W Bowman, 3000 ft., 1. DUNN COUNTY: 7 mi. N, 9 mi. W Killdeer, 2800 ft., 8. SLOPE COUNTY: 8 mi. N, 7½ mi. W Amidon, 1. STARK COUNTY: 1 mi. N, 1 mi. W Dickinson, 2700 ft., 3; ½ mi. W Dickinson, 2500 ft., 15.

We found the northern pocket gopher to be at least locally abundant throughout much of southwestern North Dakota (see also Bailey, 1927: 130-133). Along the Little Missouri River (south of Medora, northwest of Amidon, and southwest of Bowman), pocket gophers were commonest in relatively undisturbed vegetation of grasses and some sagebrush on the sandy flood plain of the river. All of our specimens from northwest of Killdeer were taken from a single alfalfa field. Those from ½ mi. W Dickinson were taken in a vacant lot that was being prepared for a housing development, whereas gophers from

1 mi. N and 1 mi. W Dickinson were trapped in sandy soil under native grasses.

None of our adult females, taken between mid-June and the first part of August, was pregnant. Three females, however, possessed placental scars numbering five, six, and seven. Four adult males had the following testicular lengths on the dates indicated: 17 (20 June); 12, 12 (26, 27 June); 10 (22 July).

The sample from south of Medora, collected between 25 and 29 June 1965, is of interest because two size classes are easily discernable. One is composed of individuals that are 200 millimeters or less (158 is smallest) in total length that evidently were born in the spring; the other is composed of adults 210 millimeters or more in total length that most likely overwintered. Other young individuals were taken on 22 July 1970 (total length 143), 23 July 1970 (194), and 1 August 1970 (155). Our data seem to indicate that a majority of young are born in May and early June but that at least some are born as late as mid-July.

Two subspecific names possibly are applicable to specimens from southwestern North Dakota—*rufescens*, with type locality at Fort Clark on the Missouri River in southwestern North Dakota, and *bullatus*, with type locality at Powderville, Montana, approximately 50 miles south and west of the southwestern corner of North Dakota. Bailey (1915:98-99 and 1927:130-131) assigned specimens from Oakdale, Dickinson, Grafton, Glen Ullin, and along the Cannon Ball River to *rufescens* and specimens from Buford to *bullatus*, although he suggested that the latter probably occurred also along the Little Missouri River and in the Badlands. Examination of our material from southwestern North Dakota (Table 1) along with specimens of *bullatus* from near the type locality and specimens of *rufescens* from eastern South Dakota reveals little significant variation among the samples. Specimens from the east are darker than those from the west, but even this differentiation is not striking and no doubt is clinal. We find no justification for recognizing two races of the northern pocket gopher in southwestern North Dakota, because individuals in samples from Medora and Bowman County are indistinguishable from specimens from Dickinson and Killdeer. The exact relationship between the nominal subspecies *rufescens* and *bullatus* needs more extensive study; if, as our results suggest, the two are indistinguishable, the name *rufescens* would apply.

Lice, *Geomydoecus dakotensis* and *G. wardi*, and a flea, *Foxella ignota albertensis*, were obtained from specimens of the northern pocket gopher.

TABLE 1.—Weights and selected measurements of adult *Thomomys talpoides* from four localities in southwestern North Dakota.

Statistics of catalog number and sex	Total length	Length of tail	Length of hind foot	Length of ear	Greatest length of skull	Zygomatic breadth	Interorbital constriction	Mastoid breadth	Length of nasals	Length of max. tooththrow	Length of palate	Weight
<i>7 mi. N, 9 mi. W Killdeer, Dunn County</i>												
KU 122618♂	236.0	68.0	31.0	10.0	42.0	25.5	7.0	20.9	14.9	7.8	26.9	191.0
Mean 5♀	236.0	65.2	30.6	7.0	40.1	24.8	6.7	20.4	14.5	7.5	25.5	160.4
Minimum	225.0	61.0	30.0	6.0	38.5	23.7	6.4	19.2	13.3	7.3	24.5	142.0
Maximum	247.0	69.0	32.0	8.0	41.5	25.4	7.2	21.3	15.6	7.8	26.4	172.3
1 SE	±3.97	±1.36	±0.40	±0.45	±0.59	±0.52	±0.15	±0.34	±0.43	±0.09	±0.31	±5.95
<i>vicinity Dickinson, Stark County</i>												
KU 122625♂	243.0	74.0	34.0	7.0	41.5	25.6	7.0	21.0	15.0	7.7	28.1	158.8
KU 122624♀	225.0	57.0	28.0	7.0	38.6	24.6	6.6	20.2	13.8	7.3	25.3	127.0
KU 122630♀	226.0	69.0	29.0	8.0	39.7	26.7	6.7	20.4	13.5	7.8	26.1	163.8
<i>1 mi. S, 1 mi. W Medora, Billings County</i>												
KU 101053♂	240.0	75.0	31.0	11.0	40.5	—	6.4	21.9	15.3	7.7	27.2	172.0
KU 101057♂	232.0	72.0	30.0	8.0	42.1	27.2	6.0	20.7	16.7	7.7	26.8	156.0
KU 101059♂	235.0	63.0	27.0	8.0	29.0	—	6.0	19.6	14.6	7.3	25.1	—
Mean 16♀	228.6	67.6 ¹⁵	29.2	7.8	40.2 ¹⁵	24.7 ¹¹	6.6	20.3	14.7 ¹⁵	7.5	25.1	146.0
Minimum	210.0	60.0	26.0	7.0	38.4	22.9	5.8	19.1	13.6	7.1	23.2	114.9
Maximum	242.0	80.0	32.0	9.0	43.2	26.4	7.6	21.5	16.3	8.0	26.8	177.1
1 SE	±3.03	±1.72	±0.41	±0.21	±0.41	±0.34	±0.10	±0.17	±0.18	±0.07	±0.30	±5.12
<i>Bowman County</i>												
KU 122646♂	232.0	70.0	30.0	7.0	39.1	23.0	6.8	18.8	14.0	8.0	24.8	113.0
KU 101072♀	217.0	—	27.0	—	39.5	25.1	6.6	20.1	13.4	7.7	25.6	139.4
KU 122642♀	210.0	75.0	30.0	5.0	38.2	23.9	6.6	19.3	13.9	8.0	24.5	—

Superscript numbers indicate fewer individuals averaged than indicated in left hand column.

TABLE 2.—*Reproductive data for adult Perognathus fasciatus from southwestern North Dakota. Measurements are crown-rump for embryos and length for testes (in millimeters).*

Date	Locality	Reproductive data
16 June	Medora	1 ♀ (5 embryos × 8)
17 June	Medora	5 ♀ (no embryos), 2 ♂ (testes 7, 7)
	Dickinson	1 ♀ (6 placental scars)
18 June	Medora	3 ♀ (no embryos)
19 June	Medora	2 ♀ (no embryos), 5 ♂ (testes 4, 4, 6, 7, ?)
	Dickinson	2 ♂ (testes 7, 8)
22 June	Dickinson	1 ♀ (no embryos)
23 June	Dickinson	1 ♀ (no embryos)
25 June	Medora	4 ♀ (2, 3, 6, 6 embryos × 16, 6, 5, 4)
27 June	Medora	1 ♂ (testes 7)
19 July	Bowman	1 ♀ (7 embryos × 3)
20 July	Bowman	2 ♀ (5 embryos × 10; one no embryos)
		1 ♂ (testes 8)
22 July	Bowman	1 ♀ (7 embryos × 11), 1 ♂ (testes 7)
25 July	Killdeer	1 ♂ (testes 5)
1 August	Dickinson	2 ♀ (5 embryos × 8; juvenile)

***Perognathus fasciatus fasciatus* Wied-Neuwied, 1839**

Specimens examined (38).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 23; 5½ mi. S, 2 mi. W Medora, 2400 ft., 1. BOWMAN COUNTY: 11 mi. S, 26 mi. W Bowman, 2900 ft., 4; 13 mi. S, 26 mi. W Bowman, 3000 ft., 2. DUNN COUNTY: 7 mi. N, 5½ mi. W Killdeer, 2500 ft., 1. STARK COUNTY: 1 mi. N, 1 mi. W Dickinson, 2700 ft., 7.

The olive-backed pocket mouse is a relatively common inhabitant of grassy areas throughout southwestern North Dakota. Along the Little Missouri River south of Medora in June 1965, this species was particularly abundant in sandy areas on the flood plain of the river; 23 individuals were taken there in eight nights of trapping. On the 3.24-hectare snap-trap grid at the Dickinson IBP site, four *P. fasciatus* were obtained in the period 16 to 25 June 1970, yielding a population estimate of 1.23 individuals per hectare in relatively dry, moderately-grazed upland grasslands. On the nearby, but much smaller (1.1 hectare) and ungrazed, live-trap grid, two individuals were taken between 13 and 23 June 1970 giving an estimate of 1.81 individuals per hectare.

Notes on reproduction and food habits of *Perognathus fasciatus* from the vicinity of Medora were presented earlier by Turner and Bowles (1967:266-267). Their reproductive data and more recently acquired information are combined in Table 2.

TABLE 3.—*External and cranial measurements and weights of Perognathus fasciatus from five localities in southwestern North Dakota.*

Statistics or catalog number and sex	Total length	Length of tail	Length of hind foot	Length of ear	Weight	Greatest length of skull	Interorbital constriction	Mastoid breadth	Length of max. toothrow	Depth of cranium
<i>7 mi. N, 5 1/2 mi. W Killdeer, Dunn County</i>										
KU 122647♂	132.0	63.0	17.0	8.0	10.0	22.3	4.7	12.1	3.1	8.6
<i>1 mi. N, 1 mi. W Dickinson, Stark County</i>										
Mean (2♂, 1♀)	136.0	59.3	17.3	7.0	11.8	22.5	4.8	11.9	3.0	8.5
Minimum	130.0	56.0	16.0	7.0	10.0	21.8	4.5	11.4	2.9	8.1
Maximum	143.0	62.0	18.0	7.0	12.8	23.1	5.1	12.2	3.2	8.8
1 SE	± 3.78	± 1.76	± 0.67	—	± 0.89	± 0.38	± 0.18	± 0.25	± 0.09	± 0.21
<i>1 mi. S, 1 mi. W Medora, Billings County</i>										
Mean (3♂, 9♀)	134.7 ¹¹	61.7 ¹¹	17.2 ¹¹	7.5 ¹¹	12.2 ⁷	22.7	4.9	12.3	3.2	8.7
Minimum	125.0	57.0	16.0	7.0	10.8	22.3	4.6	12.0	3.0	8.3
Maximum	142.0	68.0	18.0	8.0	13.1	23.6	5.0	12.8	3.4	8.9
1 SE	± 1.48	± 1.05	± 0.23	± 0.16	± 0.35	± 0.12	± 0.03	± 0.10	± 0.04	± 0.05
<i>11 mi. S, 26 mi. W Bowman, Bowman County</i>										
KU 122655♂	126.0	59.0	19.0	7.0	11.8	23.4	4.8	12.4	3.1	8.3
<i>13 mi. S, 26 mi. W Bowman, Bowman County</i>										
KU 122659♀	133.0	60.0	16.0	7.0	—	22.5	4.9	11.8	3.1	8.3

Superscript numbers indicate fewer individuals averaged than indicated in left-hand column.

Of the specimens examined, only one, a nonpregnant female from 1 mi. S and 1 mi. W Medora, taken on 17 June 1965, was molting from one adult pelage to another. Molt was in progress from just behind the ears to the middle of the back and lateral slightly onto sides and cheeks. Three specimens taken on 20, 22, and 25 July 1970 were molting from a subadult to an adult pelage.

Our specimens are intergrades between *Perognathus fasciatus fasciatus* and *P. f. olivaceogriseus* distributed to the south and west, as are specimens from adjacent South Dakota (Andersen and Jones, 1971:376). The material at hand reveals a gradation in dorsal color from the darkest individuals (those from near Killdeer and Dickinson), which resemble typical *P. f. fasciatus* (type locality at Buford, North Dakota) in coloration, to pale individuals from southwest of Bowman, which are nearly intermediate in coloration between the two subspecies. External and cranial measurements (Table 3) of all specimens are relatively small and agree more closely with *olivaceogriseus* than with *fasciatus*; however, difference in size between the two races is not great (Jones, 1953:520). We have assigned our specimens to *fasciatus* because they resemble it in coloration, which is the most trenchant distinguishing characteristic.

Perognathus fasciatus was parasitized in southwestern North Dakota by mites, *Androlaelaps fahrenheitsi* and *Haemogamasus* sp., a tick, *Dermacentor andersoni*, and three kinds of fleas, *Megabothris lucifer*, *Meringis jamesoni*, and *Opisocrostitis bruneri*.

***Dipodomys ordii terrosus* Hoffmeister, 1942**

Specimens examined (10).—BOWMAN COUNTY: 5 mi. S Marmarth, 1 (USNM); 7 mi. S Marmarth, 1 (USNM); 13 mi. S, 26 mi. W Bowman, 3000 ft., 5. GOLDEN VALLEY COUNTY: 4½ mi. S, 1½ mi. W Golva, 1. SLOPE COUNTY: 10 mi. N Marmarth, 1; 6 mi. NE Marmarth, 1 (USNM).

Ord's kangaroo rat was previously known from North Dakota on the basis of the single specimen, herein also recorded, from 10 mi. N Marmarth (Baker, 1952:493). Except for a specimen from 6 mi. NE Marmarth, this rat is known only from west of, or in the immediate vicinity of, the Little Missouri River. Sandy soils for burrowing may be the major factor limiting the distribution of the species in North Dakota. The three specimens in the U.S. National Museum and the one previously reported by Baker were all found dead along roadways. Four of the five specimens from southwest of Bowman were caught by hand on the evenings of 19 and 21 July 1971 by members of a University of Kansas field party; the fifth specimen was taken in a trap in the same area, which is a tableland lying between the Little

Missouri River and Box Elder Creek and planted to winter wheat or used for rangeland.

Of the seven specimens available for study (the three in the U.S. National Museum are preserved in alcohol), two were adults with worn permanent premolars (taken 19 and 20 July), three were young individuals with permanent but unworn premolars (19 and 22 July and early November), and two were juveniles with deciduous premolars present (22 July and 15 October). The one available adult female, captured on 19 July 1970, carried three embryos that measured 15 in crown-rump length. Testes of the adult male taken on 20 July 1970 were 11 long. No evidence of molt was found on specimens examined.

Kangaroo rats from southwestern North Dakota are relatively large and dark and, therefore, assignable to the subspecies *terrosus* rather than the paler *luteolus*, which occurs to the south and east. External and cranial measurements of an adult male and adult female from southwest of Bowman are as follows: total length, 268, —; length of tail, 145, —; length of hind foot, 42, 40; length of ear, 15, 15; greatest length of skull, 40.3, 39.3; length of maxillary toothrow, 5.2, 4.9; mastoid breadth, 24.5, 23.5; maxillary breadth, 21.6, 21.5; inter-orbital constriction, 13.7, 13.7.

***Castor canadensis missouriensis* Bailey, 1919**

Specimens examined (3).—DUNN COUNTY: 8 mi. N, 7 mi. W Killdeer, 2800 ft., 1; 7 mi. N, 9 mi. W Killdeer, 2800 ft., 1. SLOPE COUNTY: 8 mi. N, 7½ mi. W Amidon, 1.

Although beaver once were abundant in southwestern North Dakota (Bailey, 1927:108-114), they appear to be relatively scarce at the present time. The only place we found abundant signs of beaver was in the Killdeer Mountains where the animals occupied small, tree-lined streams. Two skulls were picked up there and another was found along the Little Missouri River northwest of Amidon.

***Reithrodontomys megalotis dychei* J. A. Allen, 1895**

Specimens examined (29).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 19; 5½ mi. S, 2 mi. W Medora, 2400 ft., 1. BOWMAN COUNTY: 2 mi. S Bowman, 1; 11 mi. S, 26 mi. W Bowman, 2900 ft., 6. DUNN COUNTY: ¾ mi. S, 1 mi. W Dunn Center, 1. STARK COUNTY: ½ mi. N South Heart, 1.

Although the western harvest mouse was taken at several places in southwestern North Dakota, only along the Little Missouri River south of Medora and in the extreme southwestern corner of the state was the species abundant. At both localities, most specimens were obtained in areas of tall grass on sandy soils; sage often grew in the

general vicinity. A few specimens from south of Medora were taken under wild rose and other bushes near the river, but grassy areas were close at hand. The specimen from near Dunn Center was taken in the vicinity of the Lake Ilo spillway where vegetation consisted of dense brush, cattails, and tall grass; one from north of South Heart was taken in a roadside ditch in which brome grass and alfalfa grew. Our specimens appear to be the first from southwestern North Dakota as Bailey (1927:80) recorded the species in the western part of the state only from Cannon Ball and Fort Clark along the Missouri River.

Pregnant females were taken south of Medora on 17 (two), 18, 25, and 27 June 1965; these individuals carried the following numbers of embryos (crown-rump length in parentheses), respectively: five (5), six (14), five (11), five (7), five (4). Three other subadult and adult females taken during this period evinced no gross reproductive activity. A female captured on 20 July 1970 in southwestern Bowman County had five embryos that measured 13 in crown-rump length. Seven subadult and adult males taken south of Medora between 16 and 27 June 1965 had testes that averaged 7.7 (6-10) in length, whereas five males from southwestern Bowman County, trapped on 19 and 20 July 1970, had testes that averaged 7.6 (6-9) in length; a male from Stark County (1 August 1970) had testes that measured 8. An adult male taken on 17 June 1965 was molting from winter to summer pelage.

***Peromyscus leucopus aridulus* Osgood, 1909**

Specimens examined (6).—DUNN COUNTY: 7 mi. N, 9 mi. W Killdeer, 2800 ft., 6.

Our specimens and those reported by Bailey from Oakdale appear to be the only white-footed mice known from southwestern North Dakota, although the species is known from several places along the Missouri River. Our specimens were taken in stands of deciduous trees on the lower slope of the Killdeer Mountains. The subspecies *aridulus* generally is restricted west of the Missouri River to riparian and other moist situations and, therefore, often times occurs in small disjunct populations (Hoffmann and Jones, 1970:388). Mice on the Killdeer Mountains appear to be isolated by the surrounding prairie from populations along the Missouri River, but the distance between them is small.

One of the two adult females trapped on 22 July 1970 was pregnant, carrying six embryos. Three adult males taken on the same date had testes that measured 15, 15, and 16 in length. None of our specimens was actively molting.

Because of the disjunct nature of the distribution of *P. l. aridulus* and the fact that few measurements are available for the subspecies (see Osgood, 1909:123; Jones, 1964:211; Andersen and Jones, 1971:379), the following means (and extremes) of selected measurements of five adults (three males and two females) are recorded: total length, 180.0 (170-189); length of tail, 79.4 (75-83); length of hind foot, 21.2 (20-23); length of ear, 16.0 (15-17); greatest length of skull, 27.6 (27.1-28.6); zygomatic breadth, 14.4 (13.7-14.7); interorbital constriction, 4.2 (4.1-4.3); mastoid breadth, 11.5 (11.2-11.7); length of maxillary toothrow, 4.0 (3.9-4.1). Three males and one nonpregnant female weighed 25.6, 29.5, 30.8, and 30.4, respectively.

***Peromyscus maniculatus nebrascensis* (Coues, 1877)**

Specimens examined (346).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 102; 1½ mi. S Medora, 2400 ft., 5; 2 mi. S, 1½ mi. E Medora, 2400 ft., 8; 5½ mi. S, 2 mi. W Medora, 2400 ft., 4. BOWMAN COUNTY: 2 mi. S Bowman, 6; 8 mi. S, 26 mi. W Bowman, 2900 ft., 6; 11 mi. S, 26 mi. W Bowman, 2900 ft., 65; 13 mi. S, 26 mi. W Bowman, 3000 ft., 6. DUNN COUNTY: 8 mi. N, 7 mi. W Killdeer, 2800 ft., 6; 7 mi. N, 9 mi. W Killdeer, 2800 ft., 16; 7 mi. N, 5½ mi. W Killdeer, 2500 ft., 5; 6 mi. N, 6½ mi. W Killdeer, 2700 ft., 2; 5 mi. N, 6½ mi. W Killdeer, 3000 ft., 4; ½ mi. N, 2½ mi. W Dunn Center, 1; ½ mi. N, 2 mi. W Dunn Center, 4; 3½ mi. W Dunn Center, 2; ¾ mi. S, 1 mi. W Dunn Center, 4; ¼ mi. N Manning, 2. GOLDEN VALLEY COUNTY: 2½ mi. N, 8½ mi. E Sentinel Butte, 3; 1 mi. N, 9 mi. E Sentinel Butte, 1. SLOPE COUNTY: 8 mi. N, 7½ mi. W Amidon, 12. STARK COUNTY: 1 mi. N, 1 mi. W Dickinson, 2700 ft., 55; 1 mi. N, ½ mi. W Dickinson, 2700 ft., 1; 1 mi. N, 8 mi. E Dickinson, 4; 1 mi. W Dickinson, 12; ½ mi. W Dickinson, 6; 9 mi. E Dickinson, 18; ½ mi. N South Heart, 4.

The deer mouse is the commonest and most widespread species of mammal in southwestern North Dakota. We found the species most abundant in grassy uplands south of Medora, southwest of Bowman, and in the vicinity of Dickinson. However, specimens were taken also along the edge of woodlands in the Killdeer Mountains where *P. leucopus* was found in the woods, and in marshy areas near Dunn Center. Twenty *Peromyscus maniculatus* were taken during the first trapping period (16 to 25 June) on the 3.24-hectare snap-trap grid at the Dickinson IBP site, yielding an estimate of 6.8 individuals per hectare on this moderately grazed pasture.

Reproductive information from adults and subadults of male and female deer mice is summarized in Table 4. The earliest date on which a pregnant female was taken was 11 June and the latest date was 7 August. Nonpregnant subadult and adult females taken in the four time periods shown in Table 4 were, respectively, eight, 12, 13, and

six. Of these, a number were lactating and some had evident placental scars (number, average scars, range) in each period as follows: five, 6.8 (4-8); 12, 5.0 (4-6); 10, 4.8 (3-7); three, 6.7 (4-8). Specimens in juvenile pelage were taken throughout the period covered by our sampling.

Individuals molting from one adult pelage to another were taken on the following dates: 11 June, 12 June, 16 June, 19 June, 22 June, 19 July, 20 July, 22 July, 23 July, 25 July, 29 July, and 1 August. The pattern of molt in our specimens appears to be similar to that found by Brown (1963:468-469) for *Peromyscus boylii*. All of the molting individuals evidently were replacing the long, lax winter pelage with a somewhat shorter summer pelage. Many specimens noted as molting in July and early August were molting only in small patches and were mostly clothed with new summer pelage.

All of our specimens, as were those from Harding County, South Dakota (Andersen and Jones, 1971), are referable to the large, pale-colored *Peromyscus maniculatus nebrascensis* rather than to the smaller and darker *P. m. bairdii*, which occurs to the east (see also Bailey, 1927:73-74, and Dice, 1940). For use of the name *nebrascensis* instead of *osgoodi*, see Jones (1958).

The following ectoparasites were obtained from *Peromyscus maniculatus* in southwestern North Dakota: mites, *Androlaelaps fahrenheitzi*, *Dermacarus* sp., *Haemogamasus* sp., and *Histionyssus* sp.; ticks, *Dermacentor andersoni* and *Ixodes kingi*; a louse, *Hoplopleura hesperomydis*; fleas, *Callistopsyllus terinus*, *Epitedia wenmanni*, *Foxella ignota albertensis*, *Megabothris lucifer*, *Meringis jamesoni*, *Monopsyllus wagneri*, and *Orchopeas leucopus*.

***Onychomys leucogaster missouriensis* (Audubon and Bachman, 1851)**

Specimens examined (8).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 1. BOWMAN COUNTY: 11 mi. S, 26 mi. W Bowman, 2900 ft., 1; 13 mi. S, 26 mi. W Bowman, 3000 ft., 2. STARK COUNTY: 1 mi. N, 1 mi. W Dickinson, 2700 ft., 3; ½ mi. W Dickinson, 2500 ft., 1.

This grasshopper mouse occurs throughout southwestern North Dakota, but we found it nowhere common. Only one individual was taken between 15 and 24 June 1970 on a 3.24-hectare snap-trap grid northwest of Dickinson, for example, and but one additional individual was taken on the same grid between 1 and 10 August. All eight individuals in our collections were taken in upland grassy areas where sage also was abundant.

Only one of the five females obtained was pregnant; this individual carried a single embryo that measured 14 in crown-rump length on

TABLE 4.—*Reproductive data for subadult and adult Peromyscus maniculatus from southwestern North Dakota in the period 11 June to 10 August.*

Dates	Pregnant females				Testes of males					
	N	Average embryos	(Range)	Mode	N	Average length	(Range)	N	Average width	(Range)
11 June-20 June	17	4.9	(4-7)	5	60	9.1	(4-12)	22	5.4	(3-7)
21 June-30 June	13	4.3	(1-7)	4	32	8.8	(1-14)	9	5.9	(4-7)
19 July-25 July	22	5.1	(3-7)	5	62	9.4	(4-17)	25	5.8	(2-9)
29 July-10 August	7	5.9	(4-7)	6	37	8.4	(3-12)	18	6.3	(4-8)

4 August 1970. Bailey (1927:85) reported a female taken on 30 May 1910 at Buford that contained four embryos. Two adult males and one subadult had testes that measured, respectively, 12 (20 July), 15 (10 August), and 9 (4 August) in length. An adult female and male trapped southwest of Bowman on 20 July and 22 July, respectively, appeared to be molting from winter to summer pelage. Molt was just beginning along the flanks of the male, whereas it was completed in that area on the female and was evident on the dorsum.

Specimens of *Onychomys leucogaster* were found to be parasitized by the following ectoparasites in southwestern North Dakota: four mites, *Androlaelaps fahrenheitsi*, *Eubrachyla elaps* sp., *Haemogamasus* sp., and *Ischyropoda armatus*; a louse, *Polyplax auricularis*; and two fleas, *Meringis jamesoni* and *Monopsyllus exilis*.

***Neotoma cinerea rupicola* J. A. Allen, 1894**

Specimens examined (2).—DUNN COUNTY: 5 mi. N, 6½ mi. W Killdeer, 3000 ft., 1. SLOPE COUNTY: 8 mi. N, 7½ mi. W Amidon, 1.

Although we obtained only two bushy-tailed woodrats in southwestern North Dakota in the course of our field work, the species evidently is locally common in the badlands and other areas of rocky outcroppings (Bailey, 1927:86-87). A specimen from the Killdeer Mountains was shot as it ran along an outcrop on the bluffs forming the southeastern edge of the Killdeers; this area was unforested, the only cover being grass and creeping cedar. The specimen from northwest of Amidon was trapped under a large rock in the breaks along the Little Missouri River; a few sticks comprised evidence of woodrat activity under the rock.

The specimen from Amidon, a juvenile male taken on 29 June 1961, evinced molt in a small area on the posterior flanks. The specimen from the Killdeers, a subadult female, was molting over its sides and posterior back when captured on 24 July 1970. Because both of our specimens are immature, we have been unable to assess their taxonomic status and have followed Bailey in assigning them to the subspecies *rupicola*.

Our specimen of *Neotoma cinerea* from the Killdeer Mountains harbored fleas, *Monopsyllus wagneri*.

***Lagurus curtatus pallidus* (Merriam, 1888)**

Specimens examined (4).—BOWMAN COUNTY: 13 mi. S, 26 mi. W Bowman, 3000 ft., 1. STARK COUNTY: 1 mi. W Dickinson, 1; ½ mi. W Dickinson, 2500 ft., 2.

This rare microtine previously was known from but two localities in North Dakota—Fort Buford and Glen Ullin (Bailey, 1927:101). Our three sagebrush voles from west of Dickinson were trapped in a roadside ditch that was grown to brome grass, blue stem, and some forbs. Adjacent pasture land was being grazed at the time the voles were trapped. An immature individual from southwest of Bowman was caught in a weedy area on a small road embankment near a wheat field, with open pasture and sagebrush on the other side of the road.

An adult female trapped on 14 June 1970 at a place 1 mi. W Dickinson was lactating; this specimen had four placental scars in the left uterine horn and one in the right, four corpora lutea in the left ovary and three in the right. Another adult female, which was trapped ½ mi. W Dickinson on 4 August 1970, evinced no gross reproductive activity. A second specimen from that place and date was a subadult female. The one specimen from Bowman County, a juvenile male, had testes that measured 3 on 22 July 1970. None of the four specimens was molting.

The subspecies *pallidus* was described originally on the basis of material from Fort Buford, North Dakota. Measurements of the two adult females are as follows: total length, 137, 133; length of tail, 24, 27; length of hind foot, 18, 19; length of ear, 9, 12; greatest length of skull, 24.7, 25.1; zygomatic breadth, 14.6, 15.3; interorbital constriction, 3.3, 3.5; lambdoidal breadth, 12.0, 12.9; length of rostrum, 7.6, 8.0; length of nasals, 7.3, 7.3; length of maxillary toothrow, 6.3, 6.5.

***Microtus ochrogaster haydenii* (Baird, 1858)**

Specimens examined (8).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 4; 1½ mi. S Medora, 2400 ft., 1; 2 mi. S, 1½ mi. E Medora, 2400 ft., 1. BOWMAN COUNTY: 11 mi. S, 26 mi. W Bowman, 2900 ft., 2.

The prairie vole evidently is not so abundant as the meadow vole in southwestern North Dakota. We took specimens in areas of tall grass on the sandy flood plain of the Little Missouri just south of Medora and in a brushy draw 2 mi. S and 1½ mi. E Medora. At a place 1½ mi. S Medora, a specimen was taken in an area of short grass on a butte above the floodplain of the Little Missouri. Southwest of Bowman, one specimen was taken on a bank of a small wash that supported sweet clover, and another in tall grass and sagebrush near the Little Missouri River. All of our specimens were trapped in relatively dry situations.

A female obtained on 16 June carried six embryos that measured 8 in crown-rump length; another trapped on 18 June contained four

embryos that measured 20. A female from Bowman County had a single embryo that measured 5 in crown-rump length on 20 July. An adult male trapped on 27 June had testes that measured 13 and one taken on 20 July had testes 11 in length. Specimens taken on 16 June and 20 July were molting from one adult pelage to another.

***Microtus pennsylvanicus insperatus* (J. A. Allen, 1894)**

Specimens examined (76).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 1; 2 mi. S, 1½ mi. E Medora, 2400 ft., 4. BOWMAN COUNTY: 2 mi. S Bowman, 8; 11 mi. S, 26 mi. W Bowman, 2900 ft., 1. DUNN COUNTY: 8 mi. N, 7 mi. W Killdeer, 2800 ft., 14; 7 mi. N, 5½ mi. W Killdeer, 2500 ft., 2; ½ mi. N, 2½ mi. W Dunn Center, 1; ½ mi. N, 2 mi. W Dunn Center, 1; ¾ mi. S, 1½ mi. W Dunn Center, 5; ¼ mi. N Manning, 1. GOLDEN VALLEY COUNTY: 2½ mi. N, 8½ mi. E Sentinel Butte, 1. STARK COUNTY: 1 mi. N, 1 mi. W Dickinson, 2700 ft., 18; 1 mi. N, 8 mi. E Dickinson, 3; 1 mi. W Dickinson, 3; ½ mi. W Dickinson, 13.

The meadow vole is relatively abundant in grassy situations throughout southwestern North Dakota. We have specimens from both low-lying, mesic grasslands—such as those in the Killdeer Mountains, in the vicinity of Dunn Center, and 2 mi. S Bowman—and from dry, upland draws and ridges northwest of Sentinel Butte and the vicinity of Dickinson. On the ungrazed, live-trap grid on the Dickinson IBP site, the population of *Microtus pennsylvanicus* was relatively high at the beginning of the first trapping period (13 June 1970) and declined thereafter until no specimens were taken on the ninth and tenth days of trapping (22 and 23 June). A total of 15 individuals was marked on this 1.1-hectare grid. However, on the adjacent snap-trap grid, which was heavily grazed in the autumn so that little or no ground cover remained, no meadow voles were taken until the eighth day of trapping (23 June), when two individuals were caught. At the time these voles were taken, grass on the grid was recovering from the effects of grazing and was relatively dense in the places where voles were taken. One of the two individuals had been trapped previously and marked on the live-trap grid, resulting in a subsequent movement of at least 1400 feet. During the second trapping period at this site (2 August to 11 August 1970), five meadow voles were taken on the 3.24-hectare grid, but none was taken on the live-trap grid. These movements may be explained by the fact that only the population of meadow voles living on the ungrazed live-trap grid was able to survive the winter because other areas lacked sufficient ground cover. In the spring and early summer, as the grass cover improved on the grazed areas, voles moved from the ungrazed area into the improving habitat as their population increased through reproduction.

TABLE 5.—*Reproductive data from adult Microtus pennsylvanicus from southwestern North Dakota. Measurements are crown-rump for embryos and length for testes (in millimeters).*

Date	Locality	Reproductive data
13 June	Dickinson	2♀ (5, 5 embryos × 15, 23)
14 June	Dickinson	1♀ (8 embryos × 4), 2♂ (testes 14, 14)
22 June	Dickinson	1♀ (6 embryos × 6)
23 June	Dickinson	3♂ (testes 13, 13, 17)
25 June	Medora	1♀ (8 embryos × 13)
27 June	Medora	1♂ (testes 17)
28 June	Medora	1♀ (6 embryos × 4), 2♂ (testes 14, 15)
30 June	Bowman	3♀ (6, 6, 6 embryos × 26, 13, 7), 2♂ (testes 13, 5)
19 July	Bowman	1♂ (testes 14)
23 July	Killdeer	1♀ (7 placental scars), 3♂ (testes 7, 15, 16)
25 July	Killdeer	1♀ (lactating), 1♂ (testes 10)
29 July	Dickinson	2♂ (testes 14, 15)
1 August	Dunn Center	3♀ (6, 7 embryos × 10, 4; one no embryos), 3♂ (testes 13, 15, 15)
	Dickinson	2♂ (testes 12, 12)
2 August	Dickinson	1♀ (6 embryos × 2)
4 August	Dickinson	1♀ (8 embryos × 14), 2♂ (testes 12, 15)
5 August	Dickinson	2♀ (6, 6 embryos × 18, 10), 1♂ (testes 15)
7 August	Dunn Center	1♂ (testes 12)

Reproductive data for *Microtus pennsylvanicus* are summarized in Table 5. Adult female voles reproduced throughout the period (13 June-7 August) covered by our sampling. We have specimens that are molting from one adult pelage to another on the following dates: 13 June, 14 June, 23 June, 28 June, 30 June, 29 July, 1 August, 4 August, and 5 August. Old pelage from which June-taken specimens are molting is long, lax, and relatively pale, and we believe it to be winter pelage. Specimens taken in late July and early August were beginning molt from a short, dark pelage, which seems to be a summer pelage. It would appear, therefore, that summer pelage is retained for only a short period in this area; however, more data are necessary before any definite conclusion can be reached.

Ectoparasites collected from *Microtus pennsylvanicus* in southwestern North Dakota include: mites, *Androlaelaps fahrenheitsi*, *Eulaelaps stabularis*, *Hirstionyssus* sp., *Laelaps kochi*, *Neotrombicula subsignata*; a louse, *Hoplopleura acanthopus*; and the fleas, *Megabothris lucifer*, *Monopsyllus wagneri*, and *Orchopeas leucopus*.

***Clethrionomys gapperi loringi* (Bailey, 1897)**

Specimens examined (26).—DUNN COUNTY: 8 mi. N, 7 mi. W Killdeer, 2800 ft., 5; 7 mi. N, 9 mi. W Killdeer, 2800 ft., 18; 6 mi. N, 6½ mi. W Killdeer, 2700 ft., 2; 5 mi. N, 6½ mi. W Killdeer, 3000 ft., 1.

The population of red-backed voles on the Killdeer Mountains apparently is the only one southwest of the Missouri River in North Dakota (Bailey also recorded specimens from this area and from several places along the Missouri River). Most of our specimens were taken along logs and at the base of trees in deciduous forest that covers the Killdeer Mountains. A few specimens were taken in grassy situations at the edge of the forest, but none was trapped in open, grassy areas that surrounded the mountains.

Of nine subadult and adult females taken, only one evinced no reproductive activity. Four females, taken on 22 and 23 July 1970, were pregnant and contained seven, seven, eight, and six embryos that measured 25, 2, —, and 5, respectively, in crown-rump length. Three females trapped on 23 July were found to contain placental scars (5, 6, 7). The remaining female, obtained on 22 July possessed six corpora lutea. Ten subadult and adult males taken in the same period had testes that averaged 10.2 (8-12) in length. Six individuals that appeared to be in adult winter pelage had small areas of molt along their flanks.

Our specimens appear to be assignable to the subspecies *loringi*, which was originally named and described on the basis of material from eastern North Dakota. Means and extremes (in parentheses) of measurements of four adult males and females are: total length, 146.4 (140.0-155.0); length of tail, 40.9 (36.0-45.0); length of hind foot, 19.0 (18.0-20.0); length of ear, 14.5 (13.0-16.0); greatest length of skull, 24.8 (24.0-25.6); zygomatic breadth, 13.6 (13.2-14.2); length of rostrum, 8.3 (7.9-8.5); lambdoidal breadth, 11.1 (10.7-11.5); depth of cranium, 9.3 (9.0-9.4). Two adult females (nonpregnant) and four adult males had an average weight of 29.6 (27.0-32.6).

***Ondatra zibethicus cinnamominus* (Hollister, 1910)**

Specimen examined (1).—DUNN COUNTY: 7 mi. N, 9 mi. W Killdeer, 2800 ft., 1.

Our only specimen of this pale plains subspecies of the muskrat was trapped among the reeds and cattails surrounding a small pond just west of the Killdeer Mountains. The specimen is an adult female that was lactating when taken on 25 July 1970 and appeared to be in fresh summer pelage.

***Zapus hudsonius intermedius* Krutzsch, 1954**

Specimens examined (42).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 15; 2 mi. S, 1½ mi. E Medora, 2400 ft., 2. DUNN COUNTY: 8 mi. N, 7 mi. W Killdeer, 2800 ft., 6; 7 mi. N, 9 mi. W Killdeer, 2800 ft., 12; ½ mi. N, 2½ mi. W Dunn Center, 1; 3½ mi. W Dunn Center, 1; ¾ mi. S, 1½ mi. W Dunn Center, 1. STARK COUNTY: 1 mi. N, 1 mi. W Dickinson, 2700 ft., 1; 9 mi. E Dickinson, 3.

The meadow jumping mouse is locally abundant in southwestern North Dakota in riparian communities and other mesic habitats. We found jumping mice particularly abundant on the sandy flood plains of the Little Missouri River south of Medora, where they were taken in grassy areas and under trees and shrubs near the river, and 7 mi. N and 9 mi. W Killdeer, where *Zapus* was trapped under dense stands of deciduous trees and shrubs in both uplands and along a stream. Specimens from 8 mi. N and 7 mi. W Killdeer were taken in a reed-filled marshy area along a small stream lined with birch and aspen; some individuals were taken in traps set adjacent to standing water. Specimens from the vicinity of Dunn Center were trapped in areas of tall grass and brush near Lake Ilo. Those from east of Dickinson were taken in the riparian community along the Green River. The one specimen from 1 mi. N and 1 mi. W Dickinson is our only individual from a grassy upland habitat; it was the only jumping mouse taken on the IBP snap-trap grid on which 288 traps were set for 20 nights.

Of 10 adult females taken south of Medora, two were pregnant with nine (17 June) and six (19 June) embryos that measured, respectively, 16 and 10 in crown-rump length. Four other females from there (25 and 27 June) were lactating. The absence of juveniles from this relatively large sample suggests that females carried the first litter of the year. Two of seven adult females, both taken on 22 July 1970, from northwest of Killdeer carried embryos—one had nine (4 in crown-rump length) and the other had seven. A female captured on 7 August 1970 at a place ½ mi. N and 2½ mi. W Dunn Center contained eight embryos that measured 7 in crown-rump length. Seven adult males from south of Medora, taken in the period 17 June to 28 June 1965, had testes that averaged 5.7 (4-7) in length. Two males taken northwest of Killdeer on 22 July 1970 had testes that measured 3 and 6 long, whereas the specimen trapped on the IBP grid northwest of Dickinson had testes that measured 6 on 6 August 1970. None of our specimens was molting.

Our jumping mice agree in size and color with those assigned by Krutzsch (1954:447) to the subspecies *intermedius*. The systematics of *Zapus* occurring on the Great Plains is in need of critical review, however.

Androlaelaps fahrenheitsi (mite) and *Monopsyllus wagneri* (flea) were the only ectoparasites taken from our specimens of meadow jumping mice.

***Mus musculus* Linnaeus, 1758**

Specimens examined (5).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 4. DUNN COUNTY: 7 mi. N, 9 mi. W Killdeer, 2800 ft., 1.

This introduced murid evidently is relatively common in southwestern North Dakota in the vicinity of towns and farms. Our specimens from Billings County were trapped around abandoned farm buildings just south of the town of Medora. The specimen from Dunn County was trapped at the base of a hay stack located at the edge of an alfalfa field.

***Erethizon dorsatum bruneri* Swenk, 1916**

Specimen examined (1).—DUNN COUNTY: 7 mi. N, 5½ mi. W Killdeer, 2500 ft., 1.

Although the porcupine is represented in our collections by a single specimen, the species is widespread in southwestern North Dakota, especially in areas of woody vegetation. Bailey (1927:114-116) reported the porcupine as common along the Missouri River; he also recorded specimens from Wade along the Cannon Ball River, Sentinel Butte, 25 mi. S Medora, and near Marmarth.

Our specimen, a lactating female, was shot on 24 July 1970 along a country road several miles east of the Killdeer Mountains. The only trees in the area were several small willows along the roadside, the remainder of the area was either under cultivation or in pasture. Evidence of porcupine was noted on the trees in several places in the Killdeer Mountains.

***Canis latrans latrans* Say, 1823**

Specimen examined (1).—MERCER COUNTY: 7 mi. S Beulah, 1.

Although the coyote was formerly abundant in the western part of North Dakota (Bailey, 1927:157-159), its numbers have been greatly reduced by predator control programs. Our only specimen is a young individual that was found dead along State Highway 49 south of Beulah. Additionally, J. B. Bowles and J. H. Fitch sighted a female coyote and four young in the breaks along the Little Missouri River, south of Medora, on 27 June 1965.

***Vulpes vulpes regalis* Merriam, 1900**

Specimen examined (1).—DUNN COUNTY: 7½ mi. N Dickinson, 1.

Our only specimen of red fox is a skull obtained from a road-killed individual on 7 August 1970; we observed another road-killed red fox on 19 July 1970 at a place 9 mi. S Marmarth, in Bowman County, and saw one cross a highway 12 mi. N Belfield on 23 June 1965. A pair of red foxes reportedly occupied a small hill just to the north of the live-trap grid on the IBP site near Dickinson in the summer of 1969.

The swift fox, *Vulpes velox*, is rarer than the red fox in southwestern North Dakota. The only recent record of which we are aware is of a specimen from 9 mi. N and 2 mi. E Scranton, in Slope County (Pfeifer and Hibbard, 1970:835).

***Procyon lotor hirtus* Nelson and Goldman, 1930**

Specimen examined (1).—STARK COUNTY: 16 mi. S Dickinson, 1.

Our only record of the raccoon in southwestern North Dakota is an adult male that was found killed on State Highway 22 in southern Stark County on 11 August 1970. The specimen weighed 7.3 kilograms and possessed testes that measured 30 in length.

***Mustela frenata longicauda* Bonaparte, 1838**

Specimen examined (1).—STARK COUNTY: 1 mi. N, 1 mi. W Dickinson, 2700 ft., 1.

The long-tailed weasel evidently is uncommon at present in southwestern North Dakota as it is in adjacent South Dakota (Andersen and Jones, 1971:384). The only specimens listed by Hall (1951:269) from southwestern North Dakota, aside from those from the immediate vicinity of the Missouri River, were one from Medora and another from Sentinel Butte. Hall also listed a specimen from "Little Missouri River, Mountrail County," but inasmuch as the Little Missouri does not flow through Mountrail County, the place of origin of this specimen is questionable.

Our weasel was taken in a live trap on the IBP grid northwest of Dickinson; this individual evidently robbed several traps on previous nights. An adult female; it evinced no recent reproductive activity, but possessed an old placental scar in each horn of the uterus. This animal lacked a right hind leg, toes on the left hind foot, and part of its tail, presumably the result of being caught in a mower. All of these wounds were healed and the animal otherwise appeared to be in good condition.

***Mephitis mephitis hudsonica* Richardson, 1829**

Specimen examined (1).—DUNN COUNTY: 2 mi. S, ½ mi. W Manning, 1.

The striped skunk is probably, at present, the most abundant carnivore in southwestern North Dakota. Our specimen, represented by a skull alone, was killed along a highway as were individuals noted 1 mi. N and 1 mi. W Dickinson, and 3 mi. NE Dickinson, Stark County.

***Odocoileus hemionus hemionus* (Rafinesque, 1817)**

Specimen examined (1).—BILLINGS COUNTY: 1 mi. S, 1 mi. W Medora, 2300 ft., 1.

Our only specimen of the mule deer consists of a skull picked up along the Little Missouri River south of Medora, but members of our field parties sighted several individuals in the breaks and bluffs in this general area.

***Odocoileus virginianus dacotensis* Goldman and Kellogg, 1940**

Specimen examined (1).—DUNN COUNTY: 7 mi. N, 9 mi. W Killdeer, 2800 ft., 1.

White-tailed deer were abundant in the summer of 1970 in and around the Killdeer Mountains. We made numerous sightings in this area and found several crania, including the specimen listed above, and antlers.

***Antilocapra americana americana* (Ord, 1815)**

Three adult pronghorns were observed at a place 14 mi. S and 26 mi. W Bowman, Bowman County, in open rangeland.

DISCUSSION

Four general habitat types prevail in southwestern North Dakota: dry upland grassland, which is the most widespread type; mesic grasslands; woodlands, both in riparian situations and on the Killdeer Mountains; and saxicolous habitats associated with the badlands along the Little Missouri River and other rocky outcroppings. The greatest number of species appears to be more or less restricted to upland grasslands. Those taken exclusively in this habitat include *Lepus townsendii*, *Sylvilagus audubonii*, *Spermophilus tridecemlineatus*, *Cynomys ludovicianus*, *Thomomys talpoides*, *Perognathus fasciatus*, *Dipodomys ordii*, *Reithrodontomys megalotis*, *Peromyscus maniculatus*, *Onychomys leucogaster*, *Lagurus curtatus*, and *Microtus ochrogaster*. Other species such as *Sorex cinereus*, *Microtus pennsylvanicus*, and *Zapus hudsonius* occasionally were taken in upland situations, but were more abundant in mesic grasslands.

Species seemingly restricted to riparian woodland or the Killdeers included *Lepus americanus*, *Sylvilagus floridanus*, *Castor canadensis*,

Peromyscus leucopus, *Clethrionomys gapperi*, and *Erethizon dorsatum*. The introduced *Sciurus carolinensis* also is restricted to the Killdeer. *Sorex cinereus*, *Microtus pennsylvanicus*, and *Zapus hudsonius* were abundant in woodland habitats, and specimens of *Eutamias minimus* were taken in such situations. *Microtus pennsylvanicus* may have the broadest ecological tolerance of any species in southwestern North Dakota, being relatively common in all three of the above-mentioned habitats.

Saxicolous species include *Eutamias minimus*, *Neotoma cinerea*, and five species of bats (*Myotis evotis*, *M. leibii*, *M. lucifugus*, *M. volans*, and *Eptesicus fuscus*). Bats utilize this habitat primarily for roosting sites, but also use man-made structures and feed elsewhere, usually in or near woodland habitats. Placement of the carnivores and artiodactyls with any one habitat type is difficult because of the high vagility of these large mammals. Our specimens of *Canis latrans*, *Vulpes vulpes*, *Mustela frenata*, and *Mephitis mephitis* were taken in upland situations. The raccoon, *Procyon lotor*, usually is associated with riparian habitats on the Great Plains. Individuals of *Odocoileus hemionus* were observed in the breaks and bluffs along the Little Missouri River and *Odocoileus virginianus* was seen in and around the woodlands of the Killdeer Mountains. The pronghorn, *Antilocapra americana*, is a species of upland grasslands.

The 37 species of mammals native to southwestern North Dakota discussed in this account are from six faunal units as described by Hoffmann and Jones (1970:364-365). Fifteen species are widespread: *Myotis leibii*, *M. lucifugus*, *Eptesicus fuscus*, *Castor canadensis*, *Peromyscus maniculatus*, *Ondatra zibethicus*, *Erethizon dorsatum*, *Canis latrans*, *Vulpes vulpes*, *Procyon lotor*, *Mustela frenata*, *Mephitis mephitis*, *Odocoileus hemionus*, *O. virginianus*, and *Antilocapra americana*. Species (nine) with boreal or montane affinities include *Sorex cinereus*, *Myotis evotis*, *M. volans*, *Lepus americanus*, *Thomomys talpoides*, *Neotoma cinerea*, *Microtus pennsylvanicus*, *Clethrionomys gapperi*, and *Zapus hudsonius*. The steppe faunal unit is represented by *Lepus townsendii*, *Spermophilus tridecemlineatus*, *Cynomys ludovicianus*, *Perognathus fasciatus*, and *Microtus ochrogaster*. Four species (*Sylvilagus audubonii*, *Dipodomys ordii*, *Reithrodontomys megalotis*, and *Onychomys leucogaster*) have their affinities in the Southwest. The Great Basin and deciduous forest units each are represented by two species—respectively, *Eutamias minimus* and *Lagurus curtatus*, and *Sylvilagus floridanus* and *Peromyscus leucopus*. The species of the latter unit enter the area in the riparian woodland along the larger streams and rivers. Aside from the wide-

spread species, the mammalian fauna of southwestern North Dakota appears to represent a transitional region between steppe species and those characteristic of boreal or montane areas to the north on the one hand, and species representing faunas of the Southwest and Great Basin on the other.

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Ectoparasites reported herein were identified by N. Wilson and R. B. Loomis (mites), J. E. Keirans and E. K. Jones (ticks), K. C. Emerson (lice), and J. M. Kinsella (fleas). Precise locality data are not given for ectoparasites, but these data are available from the authors or the specialists listed above. Other than mammals housed in The University of Kansas Museum of Natural History, we examined specimens only in the collections of the National Museum of Natural History (USNM).

LITERATURE CITED

- ALLEN, J. A. 1875. Notes on the natural history of portions of Dakota and Montana territories, being the substance of a report to the Secretary of War on the collections made by the North Pacific Railroad Expedition of 1873, Gen. D. S. Stanley, Commander. *Proc. Boston Soc. Nat. Hist.*, 17:33-85.
- ANDERSEN, K. W., AND J. K. JONES, JR. 1971. Mammals of northwestern South Dakota. *Univ. Kansas Publ., Mus. Nat. Hist.*, 19:361-393.
- BAILEY, V. 1915. Revision of the pocket gophers of the genus *Thomomys*. *N. Amer. Fauna*, 39:1-136.
- . 1927. A biological survey of North Dakota. *N. Amer. Fauna*, 49: vi + 1-226.

- BAILEY, V., W. B. BELL, AND M. A. BRANNON. 1914. Preliminary report on the mammals of North Dakota. North Dakota Agric. Exp. Stat., 3:1-20.
- BAKER, R. H. 1952. Ord Kangaroo rat in North Dakota. J. Mamm., 33:493.
- BROWN, L. N. 1963. Maturation molts and seasonal molts in *Peromyscus boylii*. Amer. Midland Nat., 70:466-469.
- DICE, L. R. 1940. Intergradation between two subspecies of deer-mouse (*Peromyscus maniculatus*) across North Dakota. Contrib. Lab. Vert. Genetics, Univ. Michigan, 13:1-14.
- GENOWAYS, H. H. 1967. Second report of *Myotis volans* from North Dakota. Trans. Kansas Acad. Sci., 69:355.
- GLASS, B. P., AND R. J. BAKER. 1968. The status of the name *Myotis subulatus* Say. Proc. Biol. Soc. Washington, 81:257-260.
- HALL, E. R. 1951. American weasels. Univ. Kansas Publ., Mus. Nat. Hist., 4:1-466.
- HIBBARD, E. A. 1956. Range and spread of the gray and the fox squirrels in North Dakota. J. Mamm., 37:525-531.
- HOFFMANN, R. S., AND J. K. JONES, JR. 1970. Influence of late-glacial and post-glacial events on the distribution of Recent mammals on the Northern Great Plains. Pp. 355-394, in Pleistocene and Recent environments of the Central Great Plains (W. Dort, Jr., and J. K. Jones, Jr., eds.), Univ. Press Kansas, Lawrence, xii + 433 pp.
- JAMES, T. R., AND R. W. SEABLOOM. 1969. Reproductive biology of the white-tailed jackrabbit in North Dakota. J. Wildlife Mgt., 33:558-568.
- JONES, J. K., JR. 1953. Geographic distribution of the pocket mouse, *Perognathus fasciatus*. Univ. Kansas Publ., Mus. Nat. Hist., 5:515-526.
- . 1958. The type locality and nomenclatorial status of *Peromyscus maniculatus nebrascensis* (Coues). Proc. Biol. Soc. Washington, 71:107-111.
- . 1964. Distribution and taxonomy of mammals of Nebraska. Univ. Kansas Publ., Mus. Nat. Hist., 16:1-356.
- JONES, J. K., JR., AND H. H. GENOWAYS. 1966. Records of bats from western North Dakota. Trans. Kansas Acad. Sci., 69:88-90.
- . 1967. Annotated checklist of bats from South Dakota. Trans. Kansas Acad. Sci., 70:184-196.
- JONES, J. K., JR., AND W. C. STANLEY. 1962. *Myotis subulatus* in North Dakota. J. Mamm., 43:263.
- KRUTZSCH, P. H. 1954. North American jumping mice (genus *Zapus*). Univ. Kansas Publ., Mus. Nat. Hist., 7:349-472.
- LAMPE, R. P. 1971. Mammals of Carter County, Montana. Unpublished M.A. thesis, The University of Kansas, Lawrence, 68 pp.
- LILLEGRAVEN, J. A. 1970. Stratigraphy, structure and vertebrate fossils of the Oligocene Brule formation, Slim Buttes, northwestern South Dakota. Bull. Geol. Soc. Amer., 81:831-850.
- LONG, C. A., AND R. G. SEVERSON. 1969. Geographical variation in the big brown bat in the north-central United States. J. Mamm., 50:621-624.
- MILLER, G. S., JR., AND G. M. ALLEN. 1928. The American bats of the genera *Myotis* and *Pipistrellus*. Bull. U.S. Nat. Mus., 144:vii + 1-218.
- OSGOOD, W. H. 1909. Revision of the mice of the American genus *Peromyscus*. N. Amer. Fauna, 28:1-285.
- PFEIFER, W. K., AND E. A. HIBBARD. 1970. A recent record of the swift fox (*Vulpes velox*) in North Dakota. J. Mamm., 51:835.

- STEVENS, O. A. 1963. Handbook of North Dakota plants. North Dakota Inst. Regional Studies, Fargo, 324 pp.
- TURNER, R. W., AND J. B. BOWLES. 1967. Comments on reproduction and food habits of the olive-backed pocket mouse in western North Dakota. Trans. Kansas Acad. Sci., 70:266-267.

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